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THE PACKAGING CHALLENGE

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FOOD ENGINEERING

COVER STORY

Technological breakthroughs in packaging have allowed food processors to produce higher value-added products that satisfy consumer demands and provide processors with a better bottom line.

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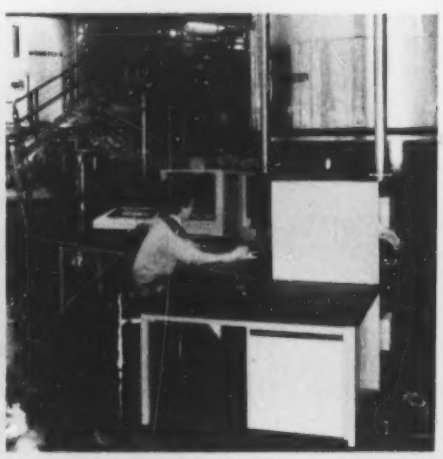

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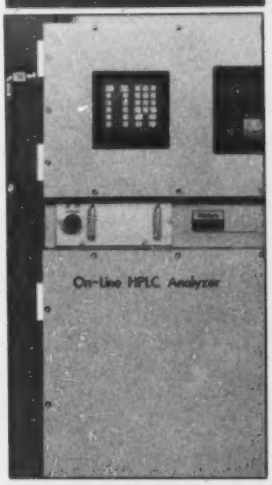

Special Emphasis

EQUIPMENT FOR BIOTECHNOLOGY WORK ON THE INCREASE

With more and more products being developed through the use of biotechnology, testing needs will continue to grow.

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Impact of science and technology on EEC food industry studied

Impact of processing methods by the year 2000

	None	Slight	Moderate	Major	Total Replies
Aseptic processing	0	1	18	25	44
Irradiation	0	11	18	15	44
Gas/modified atmosphere packaging	2	2	22	18	44
Microwave/RF heating	0	3	21	20	44
Ultrafiltration/ reverse osmosis	0	10	17	17	44
Extrusion cooking	0	5	23	16	44

Some of the conclusions of the FAST Study, conducted for the Directorate-General for Science, Research and Development of the Commission of the European Communities, indicate that the above processing methods are expected to have between moderate and major impacts on the food industry by the year 2000.

In a report to the Directorate-General for Science, Research and Development of the Commission of the European Communities, the Forecasting and Assessment in Science and Technology Programme (FAST) studied "The Impact of Food Science and Technology on the EEC Food Industry in the Next 10-15 Years." In the study, over 60 members of the Leatherhead Food R.A. were canvassed for their views on the subject. The study's purpose is to allow industry and government to plan ahead and obtain maximum benefit from scientific and technological knowledge by acquiring information on likely future trends.

Findings of the study

The major findings of the study are:

• Technologies forecasted to have a major impact by the year 2000 are process automation, biotechnology in the agricultural sector, process design, microelectronics and new packaging materials/concepts.

• Forecasted to have a moderate to major impact are biotechnology specific to the food industry, gas/modified atmosphere packaging, aseptic processing, microwave or radio frequency heating, extrusion cooking, new sensors and mathematical modeling.

• There will be a continuing and sharp decline in the usage of synthetic colors and flavors, while use of natural materials will continue to rise. Emulsifiers/stabilizers, flavor enhancers and sweeteners will remain comparatively unaffected. Use of preservatives should decline slightly.

• There will be a move towards the manufacture of food additives by biochemical means as opposed to the traditional chemical means.

• Consumption of what can be termed fresh/chilled foods will nearly double by the year 2000, while consumption of frozen foods will rise by about 25 percent. Canned foods should decline about 25 percent.

• Employment levels in the EEC food industry are forecast to decline 25 percent by the year 2000 because of scientific and technical development.

• EEC policies forecasted to exert a moderate to major influence by the year 2000 include lifting of trade barriers within Europe and regulatory policy, e.g. standardization of labeling/food composition.

• High R&D priority levels should be given to biotechnology, nutrition and health properties of foods and microbiological control.

• Issues posing a major problem by 1990 include overfishing and environmental pollution. In the long term, aging population, need to conserve resources and shortage of raw materials are seen as major problem areas.

• Irradiation is forecasted to have a medium to major impact by the year 2000, particularly in the areas of microbiological control sterilization of packaging materials, increasing shelf-life of fresh produce and pest control in commodities/raw materials.

The study concludes that over the next 15 years, food science and technology will have great impact at the manufacturing, product and social levels, resulting in more efficient production of foodstuffs and offering improved levels of quality and freshness.

For additional information, contact The British Food Manufacturing Industries Research Association, Randalls Rd., Leatherhead, Surrey, England KT22 7RY.

New tax law could disrupt distribution

Making inventory a taxable item as income for manufacturers and retailers, the 1986 Tax Act may cause imbalance in the food distribution chain, predicts Robert Estes, partner, tax department, and national director for the food industry and cooperative industry at Touche Ross & Co.

If a manufacturer has taxable inventory at the end of a fiscal period, food brokers may be called upon to sell the product so that the principal avoids paying the tax. The retailer may also be attempting to minimize inventory, making sales difficult and disrupting a smooth flow of goods.

Estes explained that the new tax laws will change the tax rates for both individuals and corporations. With the new tax reform, the upper bracket for individuals will be 28 percent and 34 percent for corporations. Some previously tax-exempt items and tax shelters have been eliminated.

Labuza named IFT President

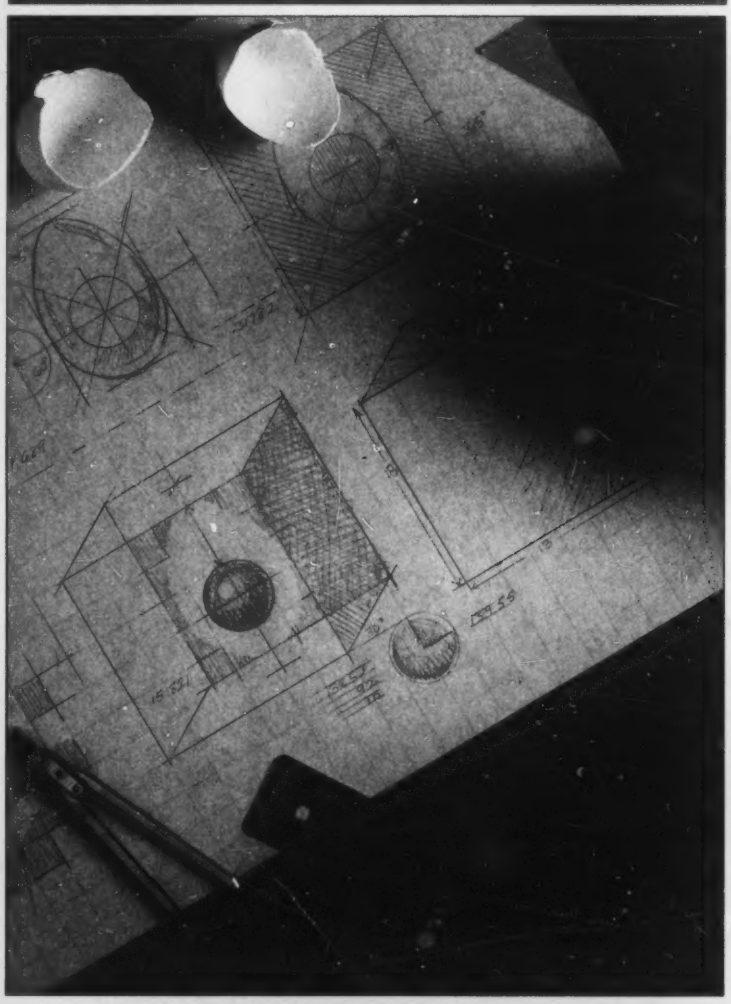
Dr. Theodore P. Labuza has been elected the 1988 President of the Institute of Food Technologists, the 23,000 member professional society of food scientists.

Now at the University of Minnesota, Labuza's major research concerns the properties of water and how they interact with processing, packaging and storage stability of foods. Other research interests center on the basic physical chemistry and kinetics involved in the shelf-life of foods and the biotechnology of the production of food flavorings.

Labuza will take office as IFT's 49th president on July 1, 1988.

COPING WITH THE PACKAGING EXPLOSION

Technological breakthroughs in metals, glass, paperboard, composites and especially plastics are providing a multitude of opportunities for improved food packaging.



Consumer demands for convenience and quality in foods have fallen on fortuitous times. Technological breakthroughs in packaging have allowed food processors to produce higher value-added products which satisfy consumer desires, while providing processors with a better bottom line.

According to Dr. Melvin Druin, vice president/packaging of the Campbell Container Co., Moorestown, NJ, "The issue is that today, packaging is significantly more important, in terms of being able to sell a food product. It had a function 5-10 years ago in terms of being able to deliver a safe product, but now we're asking it to do a lot more. We're challenging the materials to provide more utility."

The catalyst for packaging advancements has been plastic. As Curt Funke, manager of package engineering for Sara Lee puts it, "Plastics offer us a lot more alternatives in the packaging area because they are easy to automate. They can be formed into a variety of shapes. They provide multiple types of barrier qualities. They can be heat sealed for tamper evidence. They can be gas flushed or vacuum packaged to provide a different atmosphere to increase shelf life or to sell the product in a refrigerated rather than frozen state. In addition, plastics can be used on most of our processing or make-up equipment."

Food packaging growth

Studies do in fact show plastics to be the fastest growing segment of a burgeoning packaging arena. In a report entitled *Processed Foods Packaging*, FIND/SVP, a New York-based business information and research firm predicts that sales of food and beverage packaging will rise from $29 billion to $43 billion by 1990, with plastics rising from a 13.8 percent to a 17.1 percent share. In contrast, metal cans are expected to decline in market share from 37.6 percent to 36.9 percent; glass containers, from 14.7 percent to 12.4 percent; and paper, foil and composites, from 31.6 percent to 30.9 percent. Another study from Business Trend Analysts, Commack, NY, also shows rapid growth for plastics.

Two things have worked together to push plastics to the foreground. First, several alternative high barrier plastics have been developed, including PVDC, EVOH and various nylons and polyesters. The second development is the ability to economically

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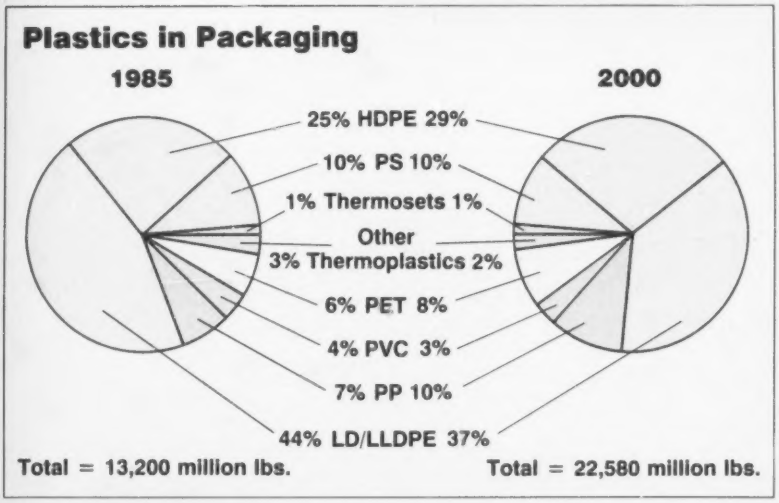
WILLIAM C. DRENNAN
Senior Editor



According to The Society of the Plastics Industry, an average annual volume growth rate of nearly four percent is forecast for plastic packaging material through the year 2000, increasing usage to 22,580 million lbs.

(Continued from previous page)

coextrude various polymers together. Burton Lundquist, director of technical services and manager of packaging for Armour Food Co., says, "Coextrusion provides an opportunity to put materials together in a more efficient, lower cost system and it provides an opportunity to put them together much differently than when we were just laminating. Because of that, use of EVOH is going to continue to expand."

These developments, coupled with new processing and preservation techniques, such as the ability to retort plastic containers, aseptic processing, and modified or controlled atmosphere packaging, have changed basic product thinking. According to Richard M. Frisosky, Packaging Manager for General Foods, "Packaging is inseparable from new market opportunities." Funke agrees, "Because of the new packaging technology available, there's a lot more opportunity for us to sell to a wider market of the retail segment of the store than we've ever had before."

Plastic packaging

Plastic packaging is a complex market – and a burgeoning one. Total consumption of plastic bottles, film and other packaging materials grew in a decade more than 300 percent, from $1.2 billion in 1975 to $4 billion in 1985. Although more mature growth ratios are expected for plastic bottles over the next decade, the total market for plastics is expected to reach $11.7 billion by 1995 (FIND/SVP).

Versatility is the key to the dynamic growth of plastics. Plastics perform a greater variety of functions in food and beverage packaging than any other material. Plastics are also uniquely compatible with new processing and preservation techniques. Refrigerated products, including CAP/MAP products, aseptic cups, retorted single-serve soups and entrees, and dual-ovenable or microwave-only products all rely on plastics to provide lightweight, barrier protection.

Metal containers

Metal cans have maintained a strong position in the beer and soft drink markets, but have declined significantly in the food categories. Predictions call for this trend to continue because of competition from fresh, refrigerated, frozen and aseptic food packaging, which are handled by plastics and composites. However, some recent developments could alter these predictions a bit. Liquid nitrogen injection has finally made the aluminum food can feasible, and some meat products have already been introduced in aluminum cans from Reynolds Metals Co. Another innovation is a pull ring top developed for steel cans by Weirton Steel Corp. These developments, along with continued lightweighting and can processing cost reductions will continue to keep metal cans competitive.

"Packaging is inseparable from new market opportunities."

R.M. Frisosky
Packaging Manager
General Foods

Packaging with glass

Over the past few years, there has been a huge shake-out in the glass industry with mergers and acquisitions reducing the major players significantly. Six companies now manufacture over 80 percent of the glass containers used in the U.S. This has occurred because of a dramatic decline in glass usage between 1980 and 1985. Contrary to common belief, it was aluminum, not plastics, which hurt the glass industry. And, it was in one particular market – beer. However, the glass industry is on the rebound. Last year, glass shipments were up about five percent, reflecting increased sales in beer, soft drinks, wine coolers and juices in single-serve bottles.

New technologies in glass have focused on lightweighting. Using a method called

"press and blow," glass is first mechanically pressed against the mold, before being blown into shape. The method, being employed in the U.S. by Owens-Illinois and American-National Can, distributes material more evenly throughout the container. This even distribution improves the strength of the bottle, while requiring less glass usage, making the container lighter. While predictions call for a continued decline in the use of glass, techniques such as lightweighting and prelabeling of bottles in the manufacturing plant, show that the glass industry is poised to respond quickly to any opportunities.

Paper, foil, composites

The combined market of paperboard, foil and composites should reach $19.2 billion by 1995 (FIND/SVP). This is due mainly to huge projected growth in frozen, refrigerated, microwave and aseptic packaging (see below). Laminated paperboard has been strong in the milk container market and is gaining increased use with juices and even wine. In the aseptic juice and juice drink market, laminated paperboard has dominance. Composite cans have become strong competitors in the powdered drink field and are looking to make inroads in the pet food and other moist product categories. Foil enjoys use mainly as lids and seals and as a barrier layer in conjunction with other materials. The battle for the frozen food segment is shaping up between various types of paperboard, plastics, and, to some extent, aluminum trays.

Microwaveable packaging

The microwave segment is probably the hottest area of growth in food packaging. The emphasis seems to be changing from dual-ovenable applications to microwave-only. The feeling among processors is that the population segments interested in convenience products are probably among the 70 percent of U.S. households which have a microwave oven. All four packaging areas – plastics, metals, glass and paperboard – are vying for a piece of this market.

Plastic packages are transparent to microwaves and therefore do not interfere with the effect of the microwave energy on foods. In some instances, this makes for uneven product heating, but the use of metallized susceptors and shielding can improve the cooking results. Plastic packaging allows a product to be taken from the freezer to the microwave to the table in a short period of time, without changing containers. Glass and paperboard are similar to plastic in that they are also microwave transparent. Glass is finding microwave applications in pasta meals, sauces and cheese products. Paperboard is used for entrees, and vegetables, including single-serve applications. Aluminum trays are attempting a comeback in the microwave segment, making use of their non-microwave transparent properties. Instead of allowing the energy to pass through unhindered, aluminum makes use of its barrier properties to shape and focus the microwave energy, via the tray and an antenna-like array in a plastic dome, in order to make optimum use of the energy.

The advent of microwave cooking has caused a re-evaluation of traditional packaging parameters. In addition to the traditional roles of protecting the product and providing a graphic medium, the package

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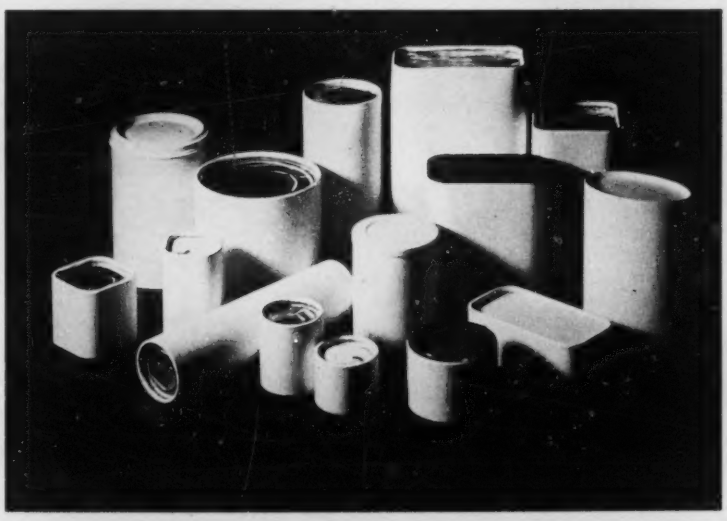
The surge in households with microwave ovens has caused most traditionally conventional-oven-only packages to be re-designed for dual-ovenable or microwave-only applications. *(Photo courtesy of Westvaco.)*



Composite containers, combining paperboard supporting structures with plastic and/or foil laminations are economical replacements for traditional materials in some applications.

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must also play a role in the final processing of the product. Besides having to know the physical properties of a wide range of packaging components, the package designer must also be able to determine how the product will react in a microwave oven in a particular form of packaging. Things like dielectric constants, thermal conductivity, density, frozen heat capacity, thawed heat capacity, and the actual geometry of both the food product and the package all have a bearing on product performance in the microwave oven.

Frozen & refrigerated foods

Freezer and refrigerated cases are receiving a lot of attention. Consumer demands for quality with convenience are finding answers in this category. But space is limited and competition is fierce. FIND/SVP predicts that frozen food shipments will go from $12.4 billion in 1985 to $29.6 billion in 1995, reflecting higher value-added products along with higher volumes. As a result, frozen food packages are being designed to optimize graphic area and appeal, in order to help the product stand out in the confusion of the freezer case.

Higher percentages of in-store decisions by consumers make product differentiation important throughout the marketplace. But nowhere is it as vital as in the freezer case. Crowded conditions and frosty doors make it difficult for a product to stand out. A good graphic presentation is needed on all four sides of the package as well as the lid. And the package configuration must be designed to stack well. Many companies are using computer graphics systems which provide a package designer with an almost infinite range of shapes and colors, interchangeable on command. This versatility in design is providing an array of package shapes and graphics in the marketplace.

Refrigerated foods either have a very short shelf life, or specialized packaging. Controlled or modified atmosphere packaging can increase refrigerated shelf life from a few days up to as much as a few weeks. This type of packaging depends heavily on plastics to act as a barrier or a control device for the particular atmosphere desired for the product. Controlled atmosphere packaging is used widely in Europe for meat, fish, pasta, prepared foods and baked goods, and is making inroads in the U.S., especially in fresh pasta. However, processors are hesitant to enter the CAP market unless they have a good regionalized distribution system. The key to CAP is tight control of the product (especially temperature control) from packaging through distribution. As experienced is gained with CAP products as well as other refrigerated products, larger companies will use acquisitions, gobbling-up firms with good distribution capabilities to handle this growing category.

"We try to provide the best package for the product, not just take a particular package. that will suffice."

Curt Funke
Manager of Package Engineering
Kitchens of Sara Lee

Plastics are rapidly changing the food packaging marketplace. Efficient coextrusion techniques along with research into blends and alloys promise to keep plastics dynamic. *(Photo courtesy of Eastman Chemical Products, Inc.)*

Shelf stable packaging

Metal and glass have traditionally dominated shelf stable food packaging. But in terms of plastics, shelf stable has the greatest potential. According to Dr. Druin, "The big growth that's being projected is in the area of shelf stable containers for retortable or aseptic applications." There are several barrier bottles on the shelves for hot fill applications, such as ketchup and sauces. Just coming onto the store shelves are soups and entrees. Campbell has microwaveable soups both retorted in plastic bowls and aseptically processed in plastic containers. Armour-Dial has its *Lunch Bucket* line of soups and meals. General Foods and Hor-

(Continued on page 76)

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mel both have shelf stable dinners in retortable plastic containers. As aseptic technology progresses further, low acid, particulate type products will be finding their way onto store shelves. For example, Campbell has recently introduced creamy soups, which according to Druin, are the first application of aseptic, low acid particulate packaging in the United States.

Distribution packaging

A hidden function of packaging is that of providing protection and ease of handling during transportation and warehousing. According to Frisosky, "If the consumer sees a damaged package – e.g. a dented corner – he believes there is a possibility that it has been tampered with. So the need is there for protective distribution packaging." This means that packages must be designed, not only in an optimum configuration to enclose the product, but also to fit in a shipping case or tray, if necessary; and to fit on a pallet in a pattern allowing the best space utilization; and to stack high enough to ship economically; and to survive rough handling during shipment and in warehouses so that the product ends up on store shelves clean and in good condition.

Flexible packaging

Total demand for food packaging should reach almost $43 million by 1990, with the biggest gains coming in plastics and composites.

As a whole, flexible packaging is continuing to make inroads against rigid packaging, due to cost savings and versatility. Besides material costs, savings can come in the form of reduced shipping costs for empty and filled containers and reduced storage space. Bag-in-box replacements for bottles and large cans, particularly in the food service area, are becoming more common. Marriages of flexible and rigid containers are increasing – e.g. composite can liners and labels, lidding for aseptic barrier containers and for CAP/MAP containers, as well as barrier/folding carton laminations.

Increased demands for convenience blend well with flexible packaging. Microwaveables, aseptics, hot fills and retortables all depend heavily on flexible packaging for their constructions. Improvements in coextrusion technology have lowered costs in relation to laminations. Barrier coextrusions make flexible packaging more versatile.

Food Packaging Demand
(Millions of Dollars)

	1975	1980	1985	1990	1995
Total Demand	14,188	22,762	29,224	42,990	63,150
Metal Cans	5,962	8,921	10,981	15,875	22,535
Glass Containers	2,654	4,079	4,300	5,305	7,700
Plastic Bottles	344	1,148	1,973	3,450	5,200
Other Plastic	902	1,330	2,046	3,880	6,485
Paper, Foil & Composites	4,052	6,805	9,226	13,275	19,235
Frozen Food Pkg.	174	246	347	530	790
Aseptic Packaging	–	–	29	145	300
Retort Pouches	–	8	12	30	100
Dual-Ovenable Pkg.	–	58	122	220	395
Dehydration, Freeze-Dry Pkg.	100	167	188	275	400
Irradiation Pkg.	–	–	–	5	10

Source: U.S. Dept. of Commerce, FIND/SVP

Who wants what?

Food packaging represents different things to different people. The government wants the package to provide protection from contamination and spoilage. The marketing department wants eye appeal and convenience. Advertising wants it to be a communications vehicle. The food technologist wants the package to maintain the stability of food components. The legal department wants the package to provide information on contents in conformity with regulations. Quality assurance wants the package to meet physical, chemical and microbiological requirements and to be in compliance with regulations. Then there is the consumer, who wants a price/value relationship that provides the following:

- Adequate shelf life;
- Convenient storage;
- Sturdiness;
- Attractiveness/informativeness;
- Dual-ovenability (if appropriate);
- Affordability;
- Protection from external contaminants;
- Ease of opening;
- Resealability;
- Flavor/aroma protection;
- Direct usage;
- Tamper evidence.

According to Lundquist, the consumer wants, "convenience *and* quality. The consumer doesn't care how convenient an item is, if it isn't any good."

It's up to the packaging department to come up with a combination of factors that will please everybody. "We try to provide the best package for the product," says Funke, "not just take a package that will suffice. We look at the product and determine how it will be used. Each product has its own characteristics and own marketplace which have to be taken into consideration."

Deciding on the package

With so many options available, how are packaging decisions reached? The days of simply enclosing a product in a protective package and putting a label on it are long gone. How is the product to be marketed? What will the package cost? What level of protection is required? What length of shelf life is desired? Is the product to be prepared in the package? How will the packaging material affect the product? Can the package be run on existing equipment? These are a few of the questions to be answered before proceeding with a new package design.

With the myriad of options available, it would be easy to lose the forest, looking at the trees. The object is always to find the right package for the product, not to dabble in possibilities for their own sake. Package engineers and designers have to keep the basics in mind. Lundquist says, "If you look at it on a broad scope, even though the shape and the graphics may be different, the basic strategy is still the same, i.e., to protect the product and to maintain the natural quality of the product throughout the merchandising cycle. So I don't think the basic strategy is changing except to improve on it."

"We tend to be orchestrators," says Frisosky. "Operations is involved, engineering is involved, purchasing is involved, marketing is involved, vendors are involved. We're there to close the loop."

What is the process for creating a new package? At General Foods, most innovations are created as a team involving engineers, marketing and packaging technologists. "With a lot of products," says Frisosky, "it's difficult to separate the product from the package, e.g. aseptic beverages, shelf stable entrees, etc., in which case the food scientist and packaging technologist operate as part of the team."

Everything starts with a product at General Foods. Marketing will decide how they want to position that product in the marketplace which then dictates packaging, be it a bulk system, single serve system or multipack system. Objectives are set in terms of the package as well as the product.

Then GF goes through a very disciplined approach, involving creative thinking in terms of putting together various sketches and forms and shapes. "We may have an array of 25 different ways of packaging the product," says Frisosky, "and not be encumbered by the process. Broad screening brings the number down to four or five, at which point prototypes are built and the product is consumer-tested."

Plastic Bottles
(Millions of Dollars)

	1975	1980	1985	1990	1995
Total Packaging	14,188	22,762	29,224	42,990	63,150
% Plastic Bottles	2.4	5.1	6.8	8.0	8.2
Consumption (Current $)	344	1,148	1,973	3,450	5,200
Price Index (1985 = 100)	82.1	95.7	100.0	123.6	156.8
Consumption (Constant $)	419	1,200	1,973	2,791	3,316
Constant 1985 $ Per Capita	1.9	5.3	8.3	11.1	12.7

Source: FIND/SVP

While the percentage of plastic bottles used is starting to peak, they are still expected to maintain a healthy share of the total packaging market.

Sara Lee also uses the team approach, with marketing usually initiating a project. Funke says, "Our support is primarily to take the product that has been developed or is going to be developed. We are given the quality that is to be put in an individual packaging form and how many of those are going to be packed into a case. We then determine what type of packaging is required and make a determination on each material and how it interfaces with the food product. We're positioned within the corporation to help all the groups. We get involved with the production process, with marketing to make sure the package is printed properly and includes any required promotional materials, and with distribution to make sure it has the proper coding to go through the distribution chain."

(Continued on next page)

Plastic trays, cans and other forms of plastic packaging are enjoying a steady climb in market share, which is expected to continue.

Other Plastic Packaging
(Millions of Dollars)

	1975	1980	1985	1990	1995
Total Packaging	14,188	22,762	29,224	42,990	63,150
% Plastic Packaging	6.4	5.8	7.0	9.1	10.3
Consumption (Current $)	902	1,330	2,046	3,880	6,485
Price Index (1985 = 100)	61.0	79.0	100.0	128.0	172.9
Consumption (Constant $)	1,479	1,684	2,046	3,031	3,751
Constant 1985 $ Per Capita	6.9	7.4	8.6	12.1	14.4

Source: FIND/SVP

Microwave packaging is a specialized art which includes the use of susceptors for browning. *(Photo courtesy of ICI Americas.)*

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Campbell Soup has 53 business units operating worldwide. Typically, these units provide Packaging with a "needs list." Dr. Druin says, "They tell us what new products are under development. If the product is totally new, they'll provide us with the parameters – e.g. how it's being processed and how they would like the consumer to be able to handle it. We'll make a decision on the appropriate container. We'll then get involved with the product development people who do food formulation and with engineering and operations. (In many cases, a new container would mandate new fillers, sealers, case packers, etc.) We try to assess the container requirements as a team in order to achieve the kind of package needed. It then becomes a business decision as to whether the costs involved justify the market opportunity."

At Armour, projects may come from anywhere. And while marketing sets the initial objectives, "we're teamworkers," says Lundquist. "Different people with different abilities contribute different information. We contribute from the standpoint of package development, product protection and in some cases, package design. We also depend on the engineering people to assist us in design and plant layout and industrial engineers on the effect of cost."

Keeping informed

The main way packaging engineers keep informed about what types of packaging are available, is to keep in touch with suppliers. Lundquist says, "The most important resource we have is that our packaging suppliers are essentially a part of our packaging team. When we do a major project, we carefully select suppliers who will participate in relation to their capability."

Funke agrees, "What we do is stay in constant contact with suppliers that are involved with key developments in the industry that serves us. We have an open door policy in the packaging engineering department. If we hear of something applicable to our work, we'll contact the supplier."

Campbell Soup has taken an active approach to keeping informed. They first try to identify the hot spots within the U.S. in terms of vendors and material suppliers. And, since most of the new technological activity is happening in plastics, Campbell has invested $4 million in a Plastics Center, a prototype center for making experimental plastic containers and brought on 15 people with close to 100 years combined experience in plastics technology. Dr. Druin says, "By investing in our Plastics Center, we can evaluate and understand the nature of the range of technologies under development. We can understand how to focus on those companies we should be working together with. Our philosophy is getting into joint developments."

Only the beginning . . .

As awesome and complex as the proliferation of packaging options has been, the fact of the matter is, we are not in the midst of the explosion – we're only at the beginning. According to Dr. Druin, "The excitement in terms of plastics technology is that we're in the very formative stages. While coextrusion is a means to the ends of what is required today, plastic technologists are going to provide us with monolithic plastics able to perform like multilayer barrier structures. With the use of blends and alloys we'll be able to tailor mix and match some of these materials to build in low oxygen permeation and sensitivity to moisture, etc. That will probably expand the market more rapidly because it will be less expensive than coextrusion."

"The name of the game is profit," says Lundquist. "If you see a new packaging opportunity, then the item is analyzed to determine its relative value." Then the final decision can be reduced to a matter of marketing and economics.

Metals, glass, paperboard and composites are all reacting to innovations in plastic materials with technological advances of their own. The net result is that opportunities to provide excellence in product/packaging systems are becoming continually more abundant.